

1993

Trapping and Banding Raptors: Eastern Shore of Virginia, National Wildlife Refuge, Wise Point, September 10, 1993 to November 16, 1993

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TRAPPING AND BANDING OF RAPTORS
EASTERN SHORE OF VIRGINIA
NATIONAL WILDLIFE REFUGE
WISE POINT

SEPTEMBER 10, 1993

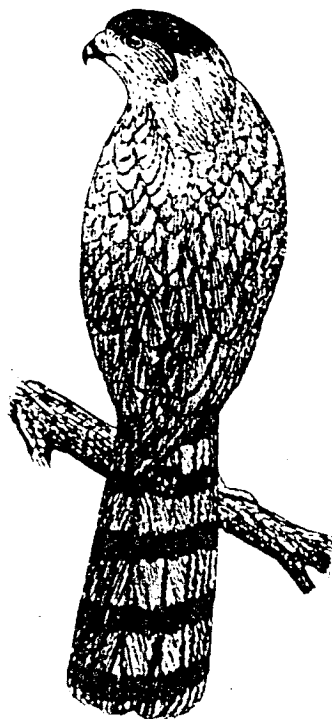
TO

NOVEMBER 16, 1993

BY

REESE F. LUKEI, JR.

DR. MITCHELL A. BYRD



COOPER'S HAWK
(*Accipiter cooperii*)

This project was operated at Wise Point on the Eastern Shore of Virginia National Wildlife Refuge under Special Use Permit # 67271 issued to Dr. Mitchell A. Byrd, Research Professor, Center for Conservation Biology, The College of William and Mary, and Reese F. Lukei, Jr., research assistant and refuge volunteer. The project is funded through the Virginia Nongame and Endangered Species Program and administered and supervised by Dr. Byrd. The daily operation of the banding site was by Reese F. Lukei, Jr., 1046 Azalea Court, Virginia Beach, Virginia 23452, telephone 804-340-5948, Federal banding permit #09351-H.

The purpose of the project is to trap and band raptors (hawks and falcons) during their fall migration. Data collected is provided to the U. S. Fish and Wildlife Bird Banding Laboratory, Office of Migratory Bird Management, the Virginia Department of Game and Inland Fisheries Nongame and Endangered Species Program, and the Eastern Shore of Virginia National Wildlife Refuge. Emphasis is placed on observations of the movement of the Peregrine Falcon, an endangered species. This project has been undertaken at this location for over ten years.

The Eastern Shore of Virginia NWR is a significant site for this activity because of its location at the southern tip of the Eastern Shore of Virginia. The raptors and other birds migrating south during the fall months follow the Atlantic coastline and shoreline of Chesapeake Bay and upon reaching the 18 miles of open water at the mouth of Chesapeake Bay, pause and wait for favorable winds before crossing the Bay to Virginia Beach. This is very similar to the situation at Cape May, New Jersey. As a result, a large number of raptors are present from about mid-September through mid-November of each year.

Two types of trapping equipment are used to capture the raptors. Mist nets are very fine nylon, 40 feet long, seven feet high, with four pockets, that are held in place with 3/4 inch metal poles. Three of these nets are used, with two outside nets set at about a 30 degree angle with the third net in the middle. The other type of trap is a bow net, which is an aluminum frame about four feet in diameter, covered loosely with cotton crab netting, which folds in half and is activated by hinged springs. The release of the trap is controlled by a pull line from a blind. Two of these traps are used and are placed on the ground between the three mist nets. Refer to map #2.

Pigeons (rock dove), starlings and brown-headed cowbirds are used as lures. The cowbirds are used under USFWS permit #PRT-688032. The lure birds are placed in leather or cloth harnesses which are attached to dacron fish line that runs along the ground between the blind and wooden lure poles placed beyond the far ends of the mist nets. These lines are pulled to allow the lure birds to fly, thus attracting the migrating raptors to the banding site.

The blind is a wooden structure ten feet long, four feet wide and seven feet high, with open windows on all sides for viewing. There is a door at each end. It will accomodate four people. The blind sits on a small sandhill and faces NNE. It is shown as letter A on map #1 and arranged in relation to the nets as shown on map #2.

The banding site was in operation for 52 days from September 10 through November 16, 1993 and was open every day except for days of rainy weather. The nets were open for 416 hours, for an average of 8.0 hours per day of operation. The nets were generally opened about sunrise and remained opened until raptor activity ceased. Refer to page 8 for data on hours of raptor activity.

The bands that are used are furnished by the USFWS Bird Banding Laboratory. They are aluminum and are numbered according to size. The sizes used and raptors applied to during this project were as follows:

| <u>Size #</u> | <u>Raptor</u> |
|---------------|---|
| 2 | Male Sharp-shinned hawk |
| 3 | Female Sharp-shinned hawk |
| 3B | Female Sharp-shinned hawk Male and Female American Kestrel Male Merlin |
| 3A | Female sharp-shinned hawk |
| 4 | Female Merlin Male Cooper's hawk Male Northern Harrier |
| 5 | Female Cooper's hawk Female Northern Harrier Broad-winged hawk Red-shouldered hawk |
| 6 | Male Peregrine falcon Broad-winged hawk Red-shouldered hawk |
| 7A | Female Peregrine falcon Red-tailed hawk |
| 7B | Red-tailed hawk |
| 7D | Red-tailed hawk |

The raptors that are usually trapped and banded are:

American Kestrel - *Falco sparverius*

Merlin - *Falco columbarius*

Peregrine falcon - *Falco peregrinus*

Sharp-shinned hawk - *Accipiter straitus*

Cooper's hawk - *Accipiter cooperii*

Northern Harrier - *Circus cyaneus*

Red-tailed hawk - *Buteo jamaicensis*

The raptors that are occasionally trapped and banded are:

Northern Goshawk - *Accipiter gentilis*

Red-shouldered hawk - *Buteo lineatus*

Broad-winged hawk - *Buteo platypterus*

Rough-legged hawk - *Buteo lagopus*

The raptors that are observed but not trapped are as follows:

Bald Eagle - *Haliaeetus leucocephalus*

Golden Eagle - *Aquila chryaetos* (rare sightings)

Osprey - *Pandion haliaeetus*

Black Vulture - *Coragyps atratus*

Turkey Vulture - *Cathartus aura*

The results of trapping and banding for 1993:

| <u>Raptor</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>Totals</u> |
|----------------------|------------------|----------------|-----------------|---------------|
| American Kestrel | 12 | 1 | | 13 |
| Merlin | 32 | 32 | | 64 |
| Peregrine | 4 | 11 | 2 | 15 |
| Sharp-shinned | 101 | 328 | 47 | 476 |
| Cooper's | 44 | 128 | 18 | 190 |
| Red-tailed | 13 | 15 | 39 | 67 |
| Red-shoulder | | | 1 | 1 |
| Broad-winged | 1 | 2 | | 3 |
| Northern Harrier | 1 | 2 | | 3 |
| Total banded | <u>208</u> | <u>519</u> | <u>105</u> | <u>832</u> |
| Foreign retraps | | <u>6</u> | <u>3</u> | <u>9</u> |
| Total trapped | <u>208</u> | <u>525</u> | <u>108</u> | <u>841</u> |
| Days nets were open | 17 | 25 | 10 | 52 |
| Hours nets were open | 140 | 210 | 66 | 416 |

The age and sex of raptors that were banded:

| <u>Raptor</u> | <u>Not Sexed</u> | | <u>Male</u> | | <u>Female</u> | | <u>Total</u> | |
|------------------|------------------|------------|-------------|------------|---------------|------------|--------------|------------|
| | <u>HY</u> | <u>AHY</u> | <u>HY</u> | <u>AHY</u> | <u>HY</u> | <u>AHY</u> | <u>HY</u> | <u>AHY</u> |
| American Kestrel | | | 5 | 1 | 7 | | 12 | 1 |
| Merlin | | | 28 | 1 | 26 | 9 | 54 | 10 |
| Peregrine | | | 7 | | 77 | 1 | 14 | 1 |
| Sharp-shinned | | | 227 | 6 | 240 | 3 | 467 | 9 |
| Cooper's | | | 106 | 6 | 65 | 13 | 171 | 19 |
| Red-tailed | 64 | 3 | | | | | 64 | 3 |
| Red-shouldered | | 1 | | | | | | 1 |
| Broad-winged | 3 | | | | | | 3 | |
| Northern Harrier | | | 2 | | 1 | | 3 | |
| Totals | <u>67</u> | <u>4</u> | <u>375</u> | <u>14</u> | <u>346</u> | <u>26</u> | <u>788</u> | <u>44</u> |

HY - Hatch Year bird

AHY - After Hatch Year bird (includes AHY, SY and ASY)

The Bird Banding Laboratory does not allow sexing of
buteos (in the field).

Comparative data of the raptors banded from the years 1985-1993 at Wise Point are presented below. Data for the years 1985-1988 are from the records of Rudy Cashwell who operated the banding site during those years.

| <u>Raptor</u> | <u>1993</u> | <u>1992</u> | <u>1991</u> | <u>1990</u> | <u>1989</u> | <u>1988</u> | <u>1987</u> | <u>1986</u> | <u>1985</u> |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| American Kestrel | 13 | 13 | 12 | 26 | 56 | 13 | 30 | 12 | 6 |
| Merlin | 64 | 91 | 84 | 81 | 285 | 184 | 232 | 324 | 88 |
| Peregrine | 15 | 10 | 23 | 35 | 25 | 11 | 13 | 16 | 5 |
| Sharp-shinned | 476 | 518 | 523 | 433 | 405 | 307 | 271 | 494 | 356 |
| Cooper's | 190 | 136 | 102 | 150 | 116 | 51 | 33 | 25 | 64 |
| Northern Goshawk | | | 3 | | | | | | |
| Northern Harrier | 3 | 2 | | 5 | 9 | 6 | 10 | 5 | 3 |
| Red-tailed | 67 | 46 | 34 | 19 | 24 | 2 | 1 | 3 | 8 |
| Red-shouldered | 1 | 3 | 1 | 2 | | | | | |
| Broad-winged | 3 | 2 | 2 | 1 | | | 1 | | |
| Rough-legged | | | | | 1 | | | | |
| Total banded | 832 | 821 | 784 | 752 | 921 | 574 | 591 | 879 | 530 |

Raptors that were trapped at Wise Point in 1993 that had been banded at other locations (referred to as foreign retraps) were:

| <u>Date</u> | <u>Specie</u> | <u>Sex</u> | <u>Age</u> | <u>Band #</u> | <u>Location</u> |
|-------------|---------------|------------|------------|---------------|-----------------|
| 10-02 | Peregrine | Male | HY | 816-31541 | 1 10-02 |
| 10-03 | Sharp-shinned | Female | HY | 1423-74610 | 3 |
| 10-05 | Cooper's | Female | HY | 745-38797 | 2 10-02 |
| 10-21 | Cooper's | Female | HY | 745-93263 | 2 10-11 |
| 10-21 | Sharp-shinned | Female | HY | 1383-98945 | 3 |
| 10-28 | Cooper's | Female | AHY | 1705-07753 | 2 10-23 |
| 11-11 | Red-tailed | Unknown | HY | 1207-06561 | 3 |
| 11-16 | Red-tailed | Unknown | HY | 1387-06831 | 1 11-10 |
| 11-24 | Cooper's | Female | HY | 745-92560 | 2 11-08 |

Location

- 1 Kiptopeke State Park by Earl Hodnett
- 2 Cape May, New Jersey
- 3 Unknown at report date

As of the date of this report there has been two known recoveries at other locations of raptors banded at Wise Point in 1993:

- #1493-92459 Sharp-shinned Female HY Banded 10-28 was retrapped by Earl Hodnett at Kiptopeke State Park 11-17
- #1387-47194 Red-tailed Unknown sex HY Banded 11-11 at 11:55AM was retrapped at Cape May, NJ 11-12 at 3:20PM! Remarkable!!

Raptors that were trapped and banded at other locations and later retrapped at Wise Point during the 1992 season were:

| <u>Date</u> <u>Retrapped</u> | <u>Date</u> <u>Banded</u> | <u>Band #</u> | <u>Specie</u> | <u>Bander</u> | <u>Location</u> |
|---------------------------------|------------------------------|---------------|---------------|------------------|-----------------|
| 09-28-92✓ | 09-27-92 | 2206-00720 | P M HY | M. A. Yates | 1 |
| 10-05-92✓ | 09-23-92 | 614-74787 | C M HY | F. C. Sibley | 2 |
| 10-06-92✓ | 10-05-92 | 1043-59448 | SS F HY | Earl Hodnett | 3 |
| 10-06-92✓ | 10-06-92 | 1387-06810 | RT U HY | Earl Hodnett | 3 |
| 10-08-92✓ | 10-08-92 | 1043-59461 | SS F HY | Earl Hodnett | 3 |
| 10-09-92✓ | 10-09-92 | 1043-59476 | SS F HY | Earl Hodnett | 3 |
| 10-10-92✓ | 10-10-92 | 816-31535 | P M HY | Earl Hodnett | 3 |
| 10-18-92✓ | 10-15-92 | 1043-52208 | SS F HY | R. P. Yunick | 4 |
| 10-19-92✓ | 10-18-92 | 1043-47528 | SS F HY | W. S. Clark | 4 |
| 10-20-92✓ | 10-17-92 | 745-93257 | C F HY | E. Biglin | 4 |
| 10-25-92 | 10-25-92 | 1043-46556 | SS F HY | W. S. Clark | 4 |
| 10-25-92✓ | 10-25-92 | 745-88523 | C F HY | Shawn Padgett | 5 |
| 10-27-92✓ | 03-29-88 | 745-53317 | C F ASY | G. K. Lahr | 6 |
| 11-02-92✓ | 10-25-92 | 1043-47558 | SS F HY | W. S. Clark | 4 |
| 11-14-92 | 10-24-92 | 1053-89563 | SS F HY | L. J. Soucy, Jr. | 4 |

Locations: 1 - Assateague National Seashore, Maryland
 2 - Connecticut
 3 - Kiptopeke State Park, Virginia
 4 - Cape May, New Jersey
 5 - Fisherman Island National Wildlife Refuge, Virginia
 6 - Little Gap, Pennsylvania

Raptors that were banded at Wise Point in years prior to 1993 that have been retrapped at other locations are:

| <u>Raptor</u> | <u>Date</u> <u>Banded</u> | <u>Date</u> <u>Recovered</u> | <u>Location Recovered</u> |
|---------------|------------------------------|---------------------------------|---------------------------|
| Merlin | 09-28-82 | 05-04-86 | Baffin Island, Canada |
| Merlin | 09-29-82 | 04-22-84 | Solon, ME |
| Peregrine | 10-04-83 | 10-10-83 | Villa Clara, Cuba |
| Merlin | 10-09-83 | 12-01-85 | Adelaide Beach, FL |
| Cooper's | 10-27-83 | 05-09-84 | Cambridge, NY |
| Merlin | 09-21-84 | 04-09-85 | Guarare, Panama |
| Sharp-shinned | 09-28-84 | 01-24-89 | Charleston, SC |
| Sharp-shinned | 10-12-84 | 10-08-86 | Kittatinny Mountain, NJ |
| Sharp-shinned | 10-19-84 | 01-05-85 | Courtland, VA |
| Red-tailed | 11-03-84 | 02-19-85 | Virginia Beach, VA |
| Sharp-shinned | 09-26-85 | 05-04-89 | Randolph, NJ |
| Cooper's | 10-26-85 | 03-04-88 | Meadowbrook, PA |

(Continued next page)

| | | | |
|------------------|----------|----------|------------------------------|
| Merlin | 09-16-86 | 09-20-86 | Ponce Inlet, FL |
| Sharp-shinned | 10-04-86 | 11-27-86 | St. Augustine, FL |
| Sharp-shinned | 10-04-86 | 12-20-86 | Bokeeeia, FL |
| Sharp-shinned | 10-04-86 | 12-29-86 | Hendry County, FL |
| Sharp-shinned | 10-10-86 | 10-10-86 | Kiptopeke Beach, VA |
| Merlin | 10-10-86 | 10-15-87 | St. Johns, Newfoundland |
| Merlin | 10-10-86 | 08-10-88 | Cupids, Newfoundland |
| Merlin | 10-11-86 | 10-11-86 | Kiptepeke Beach, VA |
| America Kestrel | 09-18-87 | 01-20-88 | Anquillia, British W. Indies |
| Merlin | 09-18-87 | 11-30-88 | La Sierpa, Cuba |
| Merlin | 09-30-87 | 05-14-88 | Amherst, VA |
| Sharp-shinned | 10-06-87 | 10-05-88 | Lehigh, Furnace, NJ |
| Sharp-shinned | 10-06-87 | 10-11-88 | Cape May, NJ |
| Cooper's | 10-10-87 | 10-13-88 | Cape May, NJ |
| Cooper's | 10-10-87 | 10-15-90 | Branchville, NJ |
| Sharp-shinned | 10-11-87 | 10-18-88 | Fisherman Island NWR, VA |
| Merlin | 09-12-88 | 04-00-91 | St. Honore, Quebec, Canada |
| Merlin | 09-23-88 | 10-02-88 | Belhaven, NC |
| Merlin | 09-23-88 | 11-28-88 | Guimaro, Cuba |
| Sharp-shinned | 09-29-88 | 11-28-88 | Lake City, FL |
| Sharp-shinned | 10-01-88 | 11-05-88 | Jacksonville, FL |
| Cooper's | 10-08-88 | 02-03-89 | Swanadell Acres, DE |
| Merlin | 10-14-89 | 02-22-90 | Cueto Prov. Holguin, Cuba |
| Cooper's | 10-22-89 | 10-25-90 | Fisherman Island NWR, VA |
| Sharp-shinned | 10-30-89 | 04-20-92 | Colebrook, NH |
| American Kestrel | 09-25-90 | 07-01-91 | Phillipsburg, NJ |
| Sharp-shinned | 10-02-90 | 01-20-91 | Dagsboro, DE |
| Cooper's | 10-06-90 | 10-06-90 | Fisherman Island NWR, VA |
| Cooper's | 10-09-90 | 10-10-90 | Fisherman Island NWR, VA |
| Cooper's | 10-10-90 | 10-12-90 | Fisherman Island NWR, VA |
| Cooper's | 10-11-90 | 10-12-90 | Fisherman Island NWR, VA |
| Cooper's | 10-14-90 | 01-16-92 | Melitota, MD |
| Sharp-shinned | 11-03-90 | 04-30-91 | Skowhegan, ME |
| Cooper's | 11-03-90 | 00-00-92 | Littleton, NH |
| Sharp-shinned | 11-11-90 | 12-10-90 | Chesapeake, VA |
| Merlin | 09-18-91 | 02-08-92 | Banao, Cuba |
| Merlin | 10-06-91 | 12-01-91 | Unknown |
| Sharp-shinned | 10-15-91 | 12-24-91 | Key West, FL |
| Cooper's | 10-08-92 | 02-27-93 | Accomac, VA |
| Peregrine | 10-10-92 | 10-10-92 | Fisherman Island NWR, VA |
| Sharp-shinned | 10-25-92 | 10-26-92 | Kiptopeke Beach, VA |

Records were kept of the times (EDT) at which all raptors were trapped. Generally there are raptors present most of the day, but various species are active and therefore trapped at different times of the day. Those species that were trapped in 1993 in sufficient numbers to obtain reliable data were:

| | | | |
|---------------|------------|-----|-----------------------|
| Merlin | 40 of 64 | 63% | between 1500 and 1859 |
| Sharp-shinned | 430 of 478 | 90 | between 0700 and 1359 |
| Cooper's | 139 of 194 | 72 | between 0900 and 1459 |
| Red-tailed | 59 of 69 | 86 | between 1000 and 1459 |

The time of day (EDT) at which all raptors were trapped for the years 1989 through 1993 were as follows:

| Hour | 1989 | 1990 | 1991 | 1992 | 1993 |
|------|------|------|------|------|------|
| 0700 | 127 | 114 | 129 | 120 | 128 |
| 0800 | 118 | 133 | 111 | 113 | 118 |
| 0900 | 101 | 99 | 85 | 96 | 119 |
| 1000 | 100 | 82 | 75 | 96 | 88 |
| 1100 | 83 | 81 | 85 | 89 | 86 |
| 1200 | 62 | 44 | 61 | 71 | 70 |
| 1300 | 52 | 64 | 51 | 74 | 69 |
| 1400 | 51 | 48 | 48 | 55 | 52 |
| 1500 | 72 | 37 | 55 | 51 | 40 |
| 1600 | 82 | 34 | 63 | 41 | 36 |
| 1700 | 61 | 29 | 32 | 24 | 22 |
| 1800 | 18 | 6 | 4 | 6 | 13 |
| | 927 | 771 | 799 | 836 | 841 |

No attempt is made to record the number of raptors that are present at the banding site because of the tendency of the raptors to mill around and fly back and forth from north of the site to Fisherman Island NWR one mile south of the site. While there has been no attempt to keep record of the number of raptors that are trapped as they return from the south, it is estimated that about 15-20% are trapped as they approach from the south.

The graphs on pages 12, 13, and 14 show the time of day (EDT) that the three most common species observed at Wise Point, Sharp-shinned, Cooper's and Merlin, were trapped for the years 1989-1992. 1993 data was compiled and is comparable to 1989-1992 but is not included in the graphs in order to keep the graphs readable.

OBSERVATIONS:

Peregrine Falcon

The Peregrine Falcon, a Federal and Virginia endangered species, is the focus of this project. Records are kept daily of all the sightings of this specie. 1993 saw only a slight improvement over the 1992 season in the number of Peregrine sighted and trapped. 1992 was by a wide margin the poorest year since 1985 both in the number of sightings and the number of Peregrines trapped. Other banding stations on the East Coast had the same experience in 1992.

| <u>Year</u> | <u>Sightings</u> | <u>Trapped</u> |
|-------------|------------------|----------------|
| 1989 | 300+ | 25 |
| 1990 | 300+ | 39 |
| 1991 | 150 | 25 |
| 1992 | 70 | 12 |
| 1993 | 96 | 16 |

As has been noted in prior years, the most frequently used migration route for the Peregrine is from north to south along U.S. Route 13. Approximately 75% of the Peregrines use this route. The pine trees to the west of the banding site have grown to such height that many of the Peregrine taking this route cannot be seen from the blind. Further evidence of this occurring is that the Hawk Watch Station at Kiptopeke State Park has experienced only a slight decrease in Peregrine sightings. Some Peregrine take a brief detour to play along the tree line along the marsh (C on Map #1) before continuing their migration toward Fisherman Island to the south.

Merlin

1993 was the fourth year that a much smaller number of Merlin were sighted or trapped. Other banding stations, including Cape May, New Jersey, have had similar experience. Part of the reason at Wise Point is that the Pine trees to the north and west of the banding site have reached such a height that the Merlin are past the site before they are sighted. Merlin tend to migrate right at treetop level and move at a high rate of speed along U.S. Route 13.

Bald Eagles

Bald Eagles were observed on 18 of the 52 days the banding site was in operation. This is down from 30 out of 55 days in 1992. Two adults, one sub-adult, and two immature eagles were identified. They are most frequently seen early in the morning flying south toward Fisherman Island, and returning about mid-morning. There, however, does not seem to be a consistent pattern and there are sometimes several days between sightings. Some sightings are made on successive days. Again this year Bald Eagles were seen either landing or rising from the marsh (B on Map #1) to the immediate north of the site.

Cooper's Hawks and Sharp-shinned Hawks

There has been a significant increase in the number of Cooper's Hawks trapped in the past five years. A record number of Cooper's were trapped in 1993. There are three reasons for this, (1) there is a general increase in the population based upon the results from other banding stations (Cape May also set a record for Cooper's), (2) the site has been open more during mid-day when they are most active, and (3) more have been caught early in the morning when the site is first opened because of their tendency to spend the night sitting on the edge of the cleared brush to the north of the blind.

The number of Sharp-shinned Hawks was down in 1993 because we were unable to obtain a sufficient supply of starlings and cowbirds early in the season to use as lure birds.

Red-tailed Hawks

A record number of red-tailed hawks was trapped in 1993.

RECOMMENDATIONS:

As mentioned on page one, Wise Point is an area of significance to raptors and also neo-tropical songbirds using the Atlantic Flyway in the fall. The shrubs and brush surrounding the banding site are heavily used by passerines for feeding, rest, and security. That, of course, makes this area especially attractive for migrating Sharp-shinned and Cooper's hawks.

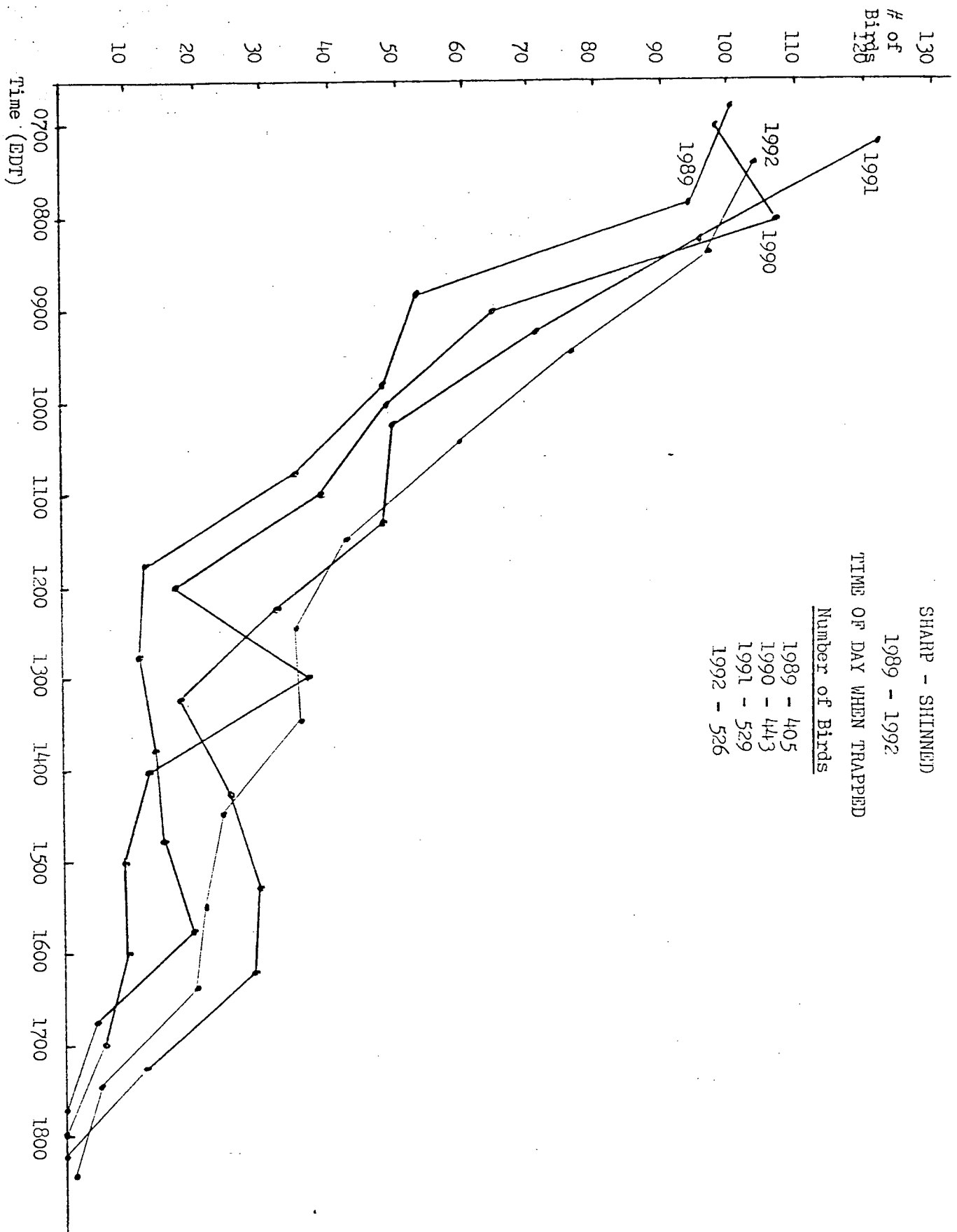
Of continued concern is the uncontrolled growth of pine trees which are taking over this area. This is a natural succession from what was the dump site for the spoil from the Inland Waterway when it was constructed. If the pines are left to populate this area as they have the areas to the north and west of the banding site, there will in only a few years be very little of the shrub and brush habitat left that the passerines so much depend upon. The pines grow densely and shade out the lower growing shrubs and brush. If the Wise Point area is to continue as a special place for passerines and as a raptor banding site, then the Refuge should develop a management plan that takes these concerns into consideration.

ACKNOWLEDGEMENTS:

My thanks to Dr. Mitchell A. Byrd, for his confidence in me and allowing me to operate the Wise Point banding station. He was able to spend much time at the site and operated the station on several days while I was away. My thanks also to Rudy Cashwell who operated the station for two days, to Walter Conrad who provided lumber and labor for a new roof for the blind, and to Earl Hodnett, Dr. Bryan Watts and Shawn Padgett who provided me with lure birds. Sherman Stairs, refuge manager, and his staff were, as they have been every year, very accommodating to me by permitting me to live on the refuge during the season, clearing the banding site and the path to it with their brush-hog, and inviting me to participate in the first Eastern Shore Birding Festival. I would not be able to carry out this project without the assistance and support of my wife, Melinda.

REPORT SUBMITTED BY:

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December 29, 1993

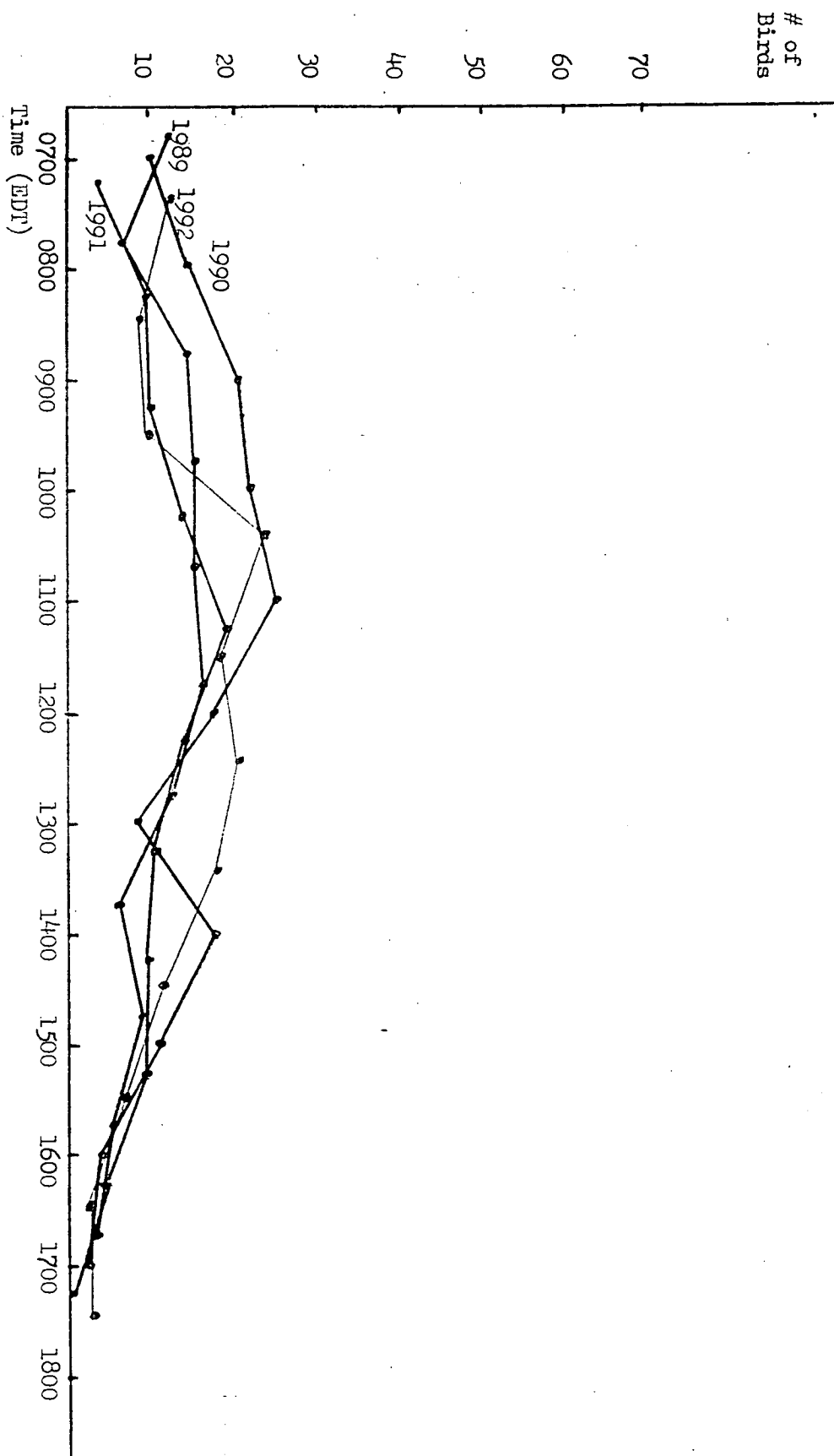


COOPER'S
1989 - 1992

TIME OF DAY WHEN TRAPPED

Number of Birds

1989 - 119
1990 - 156
1991 - 107
1992 - 140

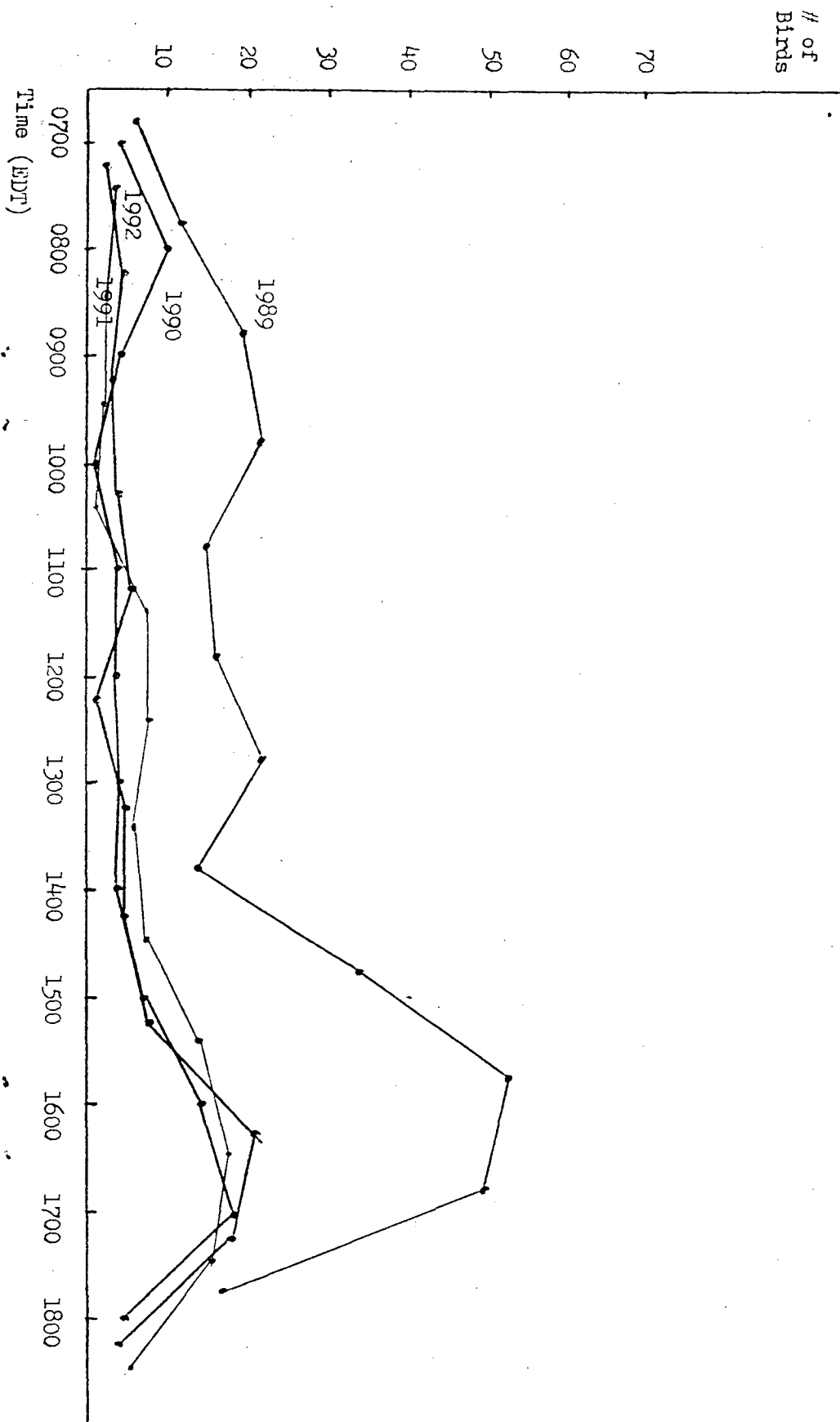


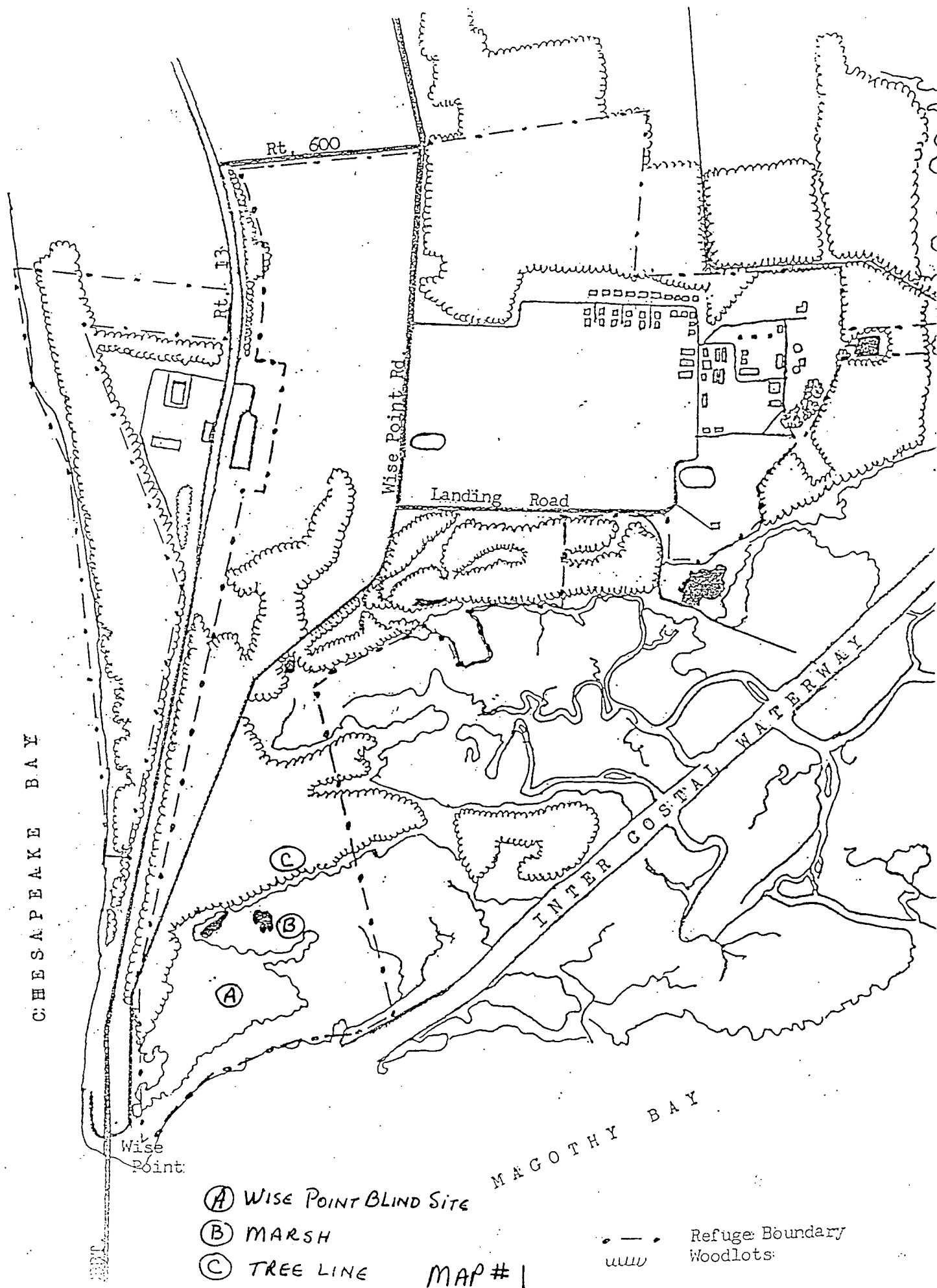
MERLIN
1989 - 1992

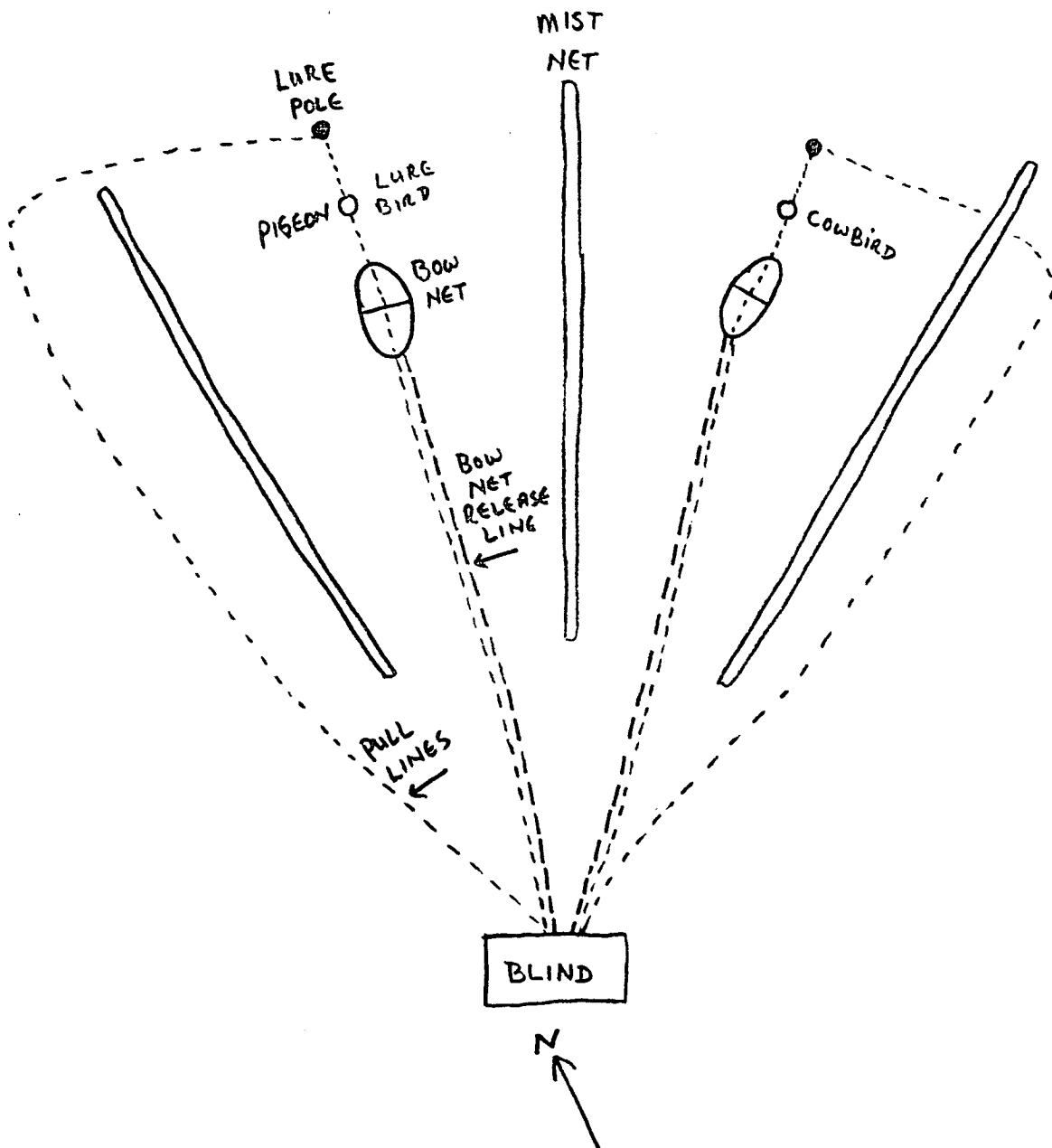
TIME OF DAY WHEN TRAPPED

Number of Birds

1989 - 285
1990 - 81
1991 - 84
1992 - 91







BANDING SITE ARRANGEMENT

MAP #2